



US008139109B2

(12) **United States Patent**
Schmiedel et al.

(10) **Patent No.:** **US 8,139,109 B2**
(45) **Date of Patent:** **Mar. 20, 2012**

(54) **VISION SYSTEM FOR AN AUTONOMOUS VEHICLE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1508 days.

3,799,284 A	3/1974	Hender
3,865,209 A	2/1975	Alhara et al.
3,966,067 A	6/1976	Reese
4,021,704 A	5/1977	Norbeck
4,041,470 A	8/1977	Slane et al.
4,088,934 A	5/1978	D'atre et al.
4,097,925 A	6/1978	Butler
4,113,045 A	9/1978	Downing
4,162,714 A	7/1979	Correll
4,180,803 A	12/1979	Wesemeyer et al.
4,196,785 A	4/1980	Downing
4,292,531 A	9/1981	Williamson
4,319,140 A	3/1982	Paschke
4,336,418 A	6/1982	Hoag
4,347,907 A	9/1982	Downing

(Continued)

(21) Appl. No.: **11/562,824**

(22) Filed: **Nov. 22, 2006**

FOREIGN PATENT DOCUMENTS

DE 18 16 183 6/1970

(65) **Prior Publication Data**

US 2007/0291130 A1 Dec. 20, 2007

(Continued)

OTHER PUBLICATIONS

International Search Report and Written Opinion for International Application No. PCT/US2009/043980, mail date Dec. 29, 2009, 10 pages.

(Continued)

(51) **Int. Cl.**

H04N 7/18 (2006.01)

Primary Examiner — Gims Philippe

(52) **U.S. Cl.** **348/118**; 348/148

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(58) **Field of Classification Search** 348/118,
348/148; 134/37; 701/25, 38, 301; 382/106;
396/419

See application file for complete search history.

(57)

ABSTRACT

A system includes a vehicle management system, and at least a first, a second, and a third video camera in communication with the vehicle management system. The vehicle management system is configured to receive input from a combination of at least two cameras selected from among the first, second, and third video cameras based on an event associated with a vehicle to provide at least a first, a second, and a third visual depth of field.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,951,089 A	3/1934	Fielder
3,524,069 A	8/1970	Stepanov et al.
3,690,559 A	9/1972	Rudloff
3,729,106 A	4/1973	Barbieri
3,764,867 A	10/1973	Smith

33 Claims, 12 Drawing Sheets

